

## CALIXPYRROLES, CALIXPYRIDINOPYRROLES AND CALIXPYRIDINES

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### Abstract of the Disclosure

The present invention provides calixpyrrole, calixpyridinopyrrole, and calixpyridine  
macrocycles, having 4, 5, 6, 7, or 8 heterocyclic rings, as well as syntheses, derivatives.  
10 conjugates, multimers, and solid supports thereof. Such macrocycles have proved to be effective  
and selective ion- and neutral molecule-binding agents forming supramolecular ensembles, and  
ion- and neutral molecule-separation agents. The macrocycles are fully *meso*-non-hydrogen-  
substituted porphyrinogens, a few molecules of which were previously known but not  
recognized as possessing anion- or molecule-binding properties. The binding mode is  
15 noncovalent, primarily that of hydrogen-bonding, thereby providing a new mode for liquid  
chromatography, that of Hydrogen Bonding Liquid Chromatography. Further useful  
applications of the macrocycles provided herein include environmental remediation by removal of  
undesired ions or neutral molecules, and removal of phosphate for kidney dialysis.

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